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10/757,645

01/13/2004

Jeffrey R. Dahn

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EXAMINER

DOVE, TRACY MAE

ART UNIT

PAPER NUMBER

1745

NOTIFICATION DATE

DELIVERY MODE

05/14/2007

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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# Office Action Summary

Application No.

10/757,645

Applicant(s)

DAHN ET AL.

Examiner

Tracy Dove

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 20 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 16-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 10/18/04; 10/20/05.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Information Disclosure Statement***

The information disclosure statements (IDSs) submitted on 10/18/04 and 10/20/05 have been considered by the examiner.

### ***Election/Restrictions***

Applicant's election with traverse of Group I, claims 1-15, in the reply filed on 3/20/07 is acknowledged. The traversal is on the ground(s) that a search of one group of claims will reveal art to the other. This is not found persuasive because the product as claimed can be made by another and materially different process. Therefore, a search of Group II (the product) would not necessarily reveal art regarding Group I (the process). Applicant asserts that when Group I is found patentable, Group II also should be found patentable. This statement is incorrect. A process claim that is indicated as allowable does not result in a product claim, made by the allowable process, being allowable. However, if Group II were elected and had become allowable, process claims directed toward a method of making an allowable product would have been considered for rejoinder. However, Group II was not elected.

The requirement is still deemed proper and is therefore made FINAL.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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The term "sufficiently dense" in claim 1 is a relative term which renders the claim indefinite. The term "sufficiently dense" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is unclear what "sufficiently dense" encompasses.

Claim 1 recites "one or both of alkali metal fluorides and boron compounds", which is improper group language. Examiner suggests "at least one selected from the group consisting of an alkali metal fluoride and a boron compound".

Claim 1 recites the limitation "the resulting mixture". There is insufficient antecedent basis for this limitation in the claim. Examiner suggests "a resulting mixture".

Numerous claims recite the phrase "at least about", which is indefinite. For example, claim 2 recites "at least about 900°C", which is indefinite because it is unclear if 899°C is encompassed by the claim. The temperature 899°C is "about" 900°C, but not "at least" 900°C. Examiner suggests the term "about" be deleted.

Claim 10 recites "72 percent of theoretical density", which is indefinite because it is unclear how the theoretical density is determined.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(c) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an

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international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3, 5-11, 14 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Shiozaki et al, JP 2002-304993.

Shiozaki teaches a positive electrode active material for a secondary battery having the formula  $\text{Li}_x\text{Mn}_a\text{Ni}_b\text{Co}_c\text{O}_2$  with a, b and c represented by the Figure shown with the abstract. Table 1 teaches a specific compound of  $\text{LiMn}_{0.35}\text{Ni}_{0.42}\text{Co}_{0.23}\text{O}_2$ , among other specific compounds. The positive electrode active material may be used in a lithium ion battery (0019). A transition mixed metal hydroxide may be used as a raw material or a precursor (0021). A boron compound is added to the mixture before heat treatment to effect sintering. The boron compound may be boric acid or boron oxide in an amount of 0.001 to 0.1 times to amount or (a+b+c) (0025). A lithium compound such as lithium hydroxide or lithium carbonate is added to the mixture (0026). The mixture is heat treated at a temperature between 950-1100°C (0027). The mixture is heat treated in oxygen atmosphere for 5 hours (0069-0080).

Thus the claims are anticipated. Claims 9-11 recite properties of the produced Li-Ni-Co-Mn-oxide compound, which are considered inherent in view of the teachings of Shiozaki.

\*

Claims 1-4 and 9-13 are rejected under 35 U.S.C. 102(e) as being anticipated by Kang et al., US 7,205,072 B2.

Kang teaches a cathode material for a lithium ion rechargeable battery. The cathode material has the formula  $\text{Li}_{1+x}\text{Ni}_\alpha\text{Mn}_\beta\text{Co}_\gamma\text{M}'_\delta\text{O}_{2-z}\text{F}_z$  wherein x is between 0 and 0.3,  $\alpha$  is between about 0.2 and 0.6,  $\beta$  is between about 0.2 and 0.6,  $\gamma$  is between about 0 and 0.3,  $\delta$  is between about 0 and 0.15, and z is between about 0 and 0.2 (abstract). To prepare the

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$\text{Li}_{1+x}\text{Ni}_\alpha\text{Mn}_\beta\text{Co}_\gamma\text{M}'_\delta\text{O}_{2-z}\text{F}_z$  compound, appropriate amounts of lithium hydroxide (or lithium carbonate), lithium fluoride and Ni-Mn-Co-hydroxide are mixed. The mixture is calcined at 450-550°C for 12-30 hours in air and then at 900-1000°C for 10-24 hours in either air or oxygen containing atmosphere (3:17-24).

Thus the claims are anticipated. Claims 9-11 recite properties of the produced Li-Ni-Co-Mn-oxide compound, which are considered inherent in view of the teachings of Kang.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiozaki et al, JP 2002-304993.

Shiozaki teaches a positive electrode active material for a secondary battery having the formula  $\text{Li}_x\text{Mn}_a\text{Ni}_b\text{Co}_c\text{O}_2$  with a, b and c represented by the Figure shown with the abstract. Table 1 teaches a specific compound of  $\text{LiMn}_{0.35}\text{Ni}_{0.42}\text{Co}_{0.23}\text{O}_2$ , among other specific compounds. The positive electrode active material may be used in a lithium ion battery (0019). A transition mixed metal hydroxide may be used as a raw material or a precursor (0021). A boron compound is added to the mixture before heat treatment to effect sintering. The boron compound may be boric acid or boron oxide in an amount of 0.001 to 0.1 times to amount or (a+b+c) (0025). A lithium compound such as lithium hydroxide or lithium carbonate is added to

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the mixture (0026). The mixture is heat treated at a temperature between 950-1100°C (0027).

The mixture is heat treated in oxygen atmosphere for 5 hours (0069-0080).

Shiozaki does not explicitly teach the mixture is heated for at least about 6 hours.

However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because heat treating for at least 6 hours is considered obvious in view of the teaching by Shiozaki to heat treat for 5 hours. Note claims 9-11 are considered inherent in view of the teachings of Shiozaki.

\*

Claims 5-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al., US 7,205,072 B2 in view of Shiozaki et al, JP 2002-304993.

Kang teaches a cathode material for a lithium ion rechargeable battery. The cathode material has the formula  $\text{Li}_{1+x}\text{Ni}_\alpha\text{Mn}_\beta\text{Co}_\gamma\text{M}'_\delta\text{O}_{2-z}\text{F}_z$  wherein x is between 0 and 0.3,  $\alpha$  is between about 0.2 and 0.6,  $\beta$  is between about 0.2 and 0.6,  $\gamma$  is between about 0 and 0.3,  $\delta$  is between about 0 and 0.15, and z is between about 0 and 0.2 (abstract). To prepare the  $\text{Li}_{1+x}\text{Ni}_\alpha\text{Mn}_\beta\text{Co}_\gamma\text{M}'_\delta\text{O}_{2-z}\text{F}_z$  compound, appropriate amounts of lithium hydroxide (or lithium carbonate), lithium fluoride and Ni-Mn-Co-hydroxide are mixed. The mixture is calcined at 450-550°C for 12-30 hours in air and then at 900-1000°C for 10-24 hours in either air or oxygen containing atmosphere (3:17-24).

Kang does not explicitly state the amount of sintering agent added to the mixture to prepare the cathode active material compound.

However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because Kang teaches an appropriate amount of

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lithium fluoride may be added to the mixture depending on the desired compound oxide to be produced. Furthermore, Figure 4 teaches and suggest varying the amount of LiF in the mixture to produce various compound oxide cathode active materials. Figure 4 at least suggest 2% of LiF was added to the mixture. Note claims 9-11 are considered inherent in view of the teachings of Kang.


### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

May 7, 2007

  
TRACY DOVE  
PRIMARY EXAMINER